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## NESTING RECORDS OF CARNABY'S COCKATOO (*CALYPTORHYNCHUS LATIROSTRIS*) FROM THE PORONGURUP RANGE, SOUTH-WEST WESTERN AUSTRALIA

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### ABSTRACT

Observations of Carnaby's Cockatoo (*Calyptorhynchus latirostris*) in the Porongurup Range, Western Australia are reported. Two breeding events were recorded: one in a natural hollow in live Karri tree during 2008, and one inside an artificial nest box, also in a live Karri, during 2011. The birds (possibly the same pair) successfully reared one chick on each occasion. Implications of the success of artificial nest boxes in the region are discussed.

### INTRODUCTION

Carnaby's Cockatoo (*Calyptorhynchus latirostris*) is a threatened, white-tailed black cockatoo, endemic to the south-west of Western Australia. Due to a significant decline in range and abundance over the past 50 years, it is listed as Endangered by Garnett *et al.* (2011) and under both state and national legislation.

The species has a distribution extending from Kalbarri to Cape Arid (Birds Australia 2012). Breeding usually occurs in eucalypt woodland, typically in the Wheatbelt and Great Southern regions of Western Australia (Birds Australia 2012). After breeding, the species moves to coastal areas and often form large flocks that wander in search of food (Cale 2003).

Like other large cockatoo species, Carnaby's Cockatoo is dependant on hollows in large, mature eucalypt trees for nesting, particularly Wandoo (*Eucalyptus wandoo*), Salmon Gum (*E. salmonophloia*), Gimlet (*E. salubris*) and York Gum (*E. loxophleba*; Johnstone and Storr 1998). Typical nesting trees are estimated to be 100–150 years old to have hollows large enough for the species to nest in (Johnstone and Storr 1998).

Nesting hollows may be located anywhere from 2 m to more than 10 m from the ground. Hollows range in depth from 0.1 m to 0.5 m to more than 2.5 m, but most are between 0.5 m and 1.5–2 m deep (Johnstone and Storr 1998).

Due to the wide scale clearance of feeding and breeding habitat, competition for tree hollows from introduced and abundant native species and fragmentation of feeding habitat near nesting sites, suitable breeding sites are becoming increasingly scarce. This paper documents the occurrence of two nesting records of the Carnaby's Cockatoo from the

Porongurup Range, an area not traditionally known as a breeding site.

## METHODS

During November 2008 we visited the Porongurup Range to conduct bird surveys on private property and to erect a large nest box suitable for black cockatoos. The property consisted of a 6 ha bush remnant situated adjacent to the Porongurup National Park, on the southern slopes of the Porongurup Range. Vegetation comprised Karri (*Eucalyptus diversicolor*) forest on deep loams and Jarrah (*E. marginata*) / Marri (*Corymbia calophylla*) forest on lateritic gravels. Initial observations of black cockatoo behaviour were made over a five day period in November 2008. Subsequent surveys of the area were conducted in December 2008, July 2010, December 2011 and January 2012.

A nest box large enough to be suitable as a black cockatoo breeding site (see Table 1) was

**Table 1.** Dimensions of Carnaby's Cockatoo Nesting Chambers. Measurements in millimetres (mm).

Nest	Tree	Entrance width (mm)	Internal Width	Internal Length	Chamber depth	Height above ground
Vertical Slit	Karri	Slit: 90 mm x 700 mm	480 mm	480 mm	1050 mm	15 m
Nest Box	Karri	Hollow log; 220 mm diameter	300 mm	370 mm	1300 mm	20 m

installed in November 2008, approximately 20 m above ground level (see Figure 1). The box was hauled into position using a rope pulley and attached with hooks and a chain to the eastern side of a large Karri tree which flanked a small seasonal creek, close to the Karri/Jarrah forest ecotone. The nest box consisted of a rectangular prism made of 18 mm form ply with a hollow Marri spout fixed to the front for a horizontal entrance (see Figure 1). Wire mesh was secured to the inside of the box to allow animals to climb

vertically into the nest chamber. Sacrificial chewing posts were installed and a layer of leaf litter and wood chips added to the chamber floor. The nest box exterior was painted to provide some protection against the elements and to increase longevity.

## RESULTS

Two Carnaby's Cockatoo nesting sites were recorded in two separate years. In November 2008 one pair was observed at a natural hollow in the side of a



**Figure 1.** Artificial nest box installed c. 20 m high in Karri tree in the Porongurup Range study area.

Karri tree, and the female was seen entering the hollow. A recently hatched chick was observed in the tree hollow on 10



**Figure 2.** Vertical entrance to nesting hollow in a large Karri tree, used by Carnaby's Cockatoos in 2008 to successfully rear one chick.

November 2008, which was fully grown by 27 December 2008.

The nest hollow (Figure 2) was a thin, vertical slit on the southern side of a large Karri tree, approximately 15 m above ground level (see Table 1). Internally, the nest chamber was 480mm in diameter and 1050 mm deep.

The nesting site was revisited in December 2011 and while no nesting activity was observed within the natural tree hollow, a pair of Carnaby's Cockatoos was observed nesting within the artificial nest box, approximately 40 m south of the 2008 site. A fully grown chick was observed within the nest box on 28 December 2011.

A pair of Carnaby's Cockatoos was reported roosting outside the nest box regularly during the 2010 breeding season, and chew marks on the entrance hollow of the artificial nest box were noted (J MacKinnon pers. comm.). These observations indicate the nest box may have also been used for breeding in 2010. Nesting by the Carnaby's Cockatoo in the survey area is summarised in Table 2.

**Table 2.** Nesting records of the Carnaby's Cockatoo within the Porongurup Range study area.

Year	Species	Comments
2008	Carnaby's Cockatoo	Nesting in Karri tree hollow (one chick)
2009	–	No nesting records
2010	Carnaby's Cockatoo	Probable nesting in nest box (assumed from observation by J. MacKinnon)
2011	Carnaby's Cockatoo	Nesting in Nest box (one chick)



Observations of the adult cockatoos during 2008, 2011 and 2012 revealed a similar feeding pattern. In early November when the chick was still covered in natal down, the female remained inside the hollow for much of the day. Later, when the chick was fully grown (late November, December and January) both adults left the nest site and remained absent for the whole day, returning to roost near the nest on or after sunset.

## DISCUSSION

There are few accounts of Carnaby's Cockatoo nesting in Karri trees and few accounts of the species nesting in the Porongurup area (Groom 2010). The Recovery Plan for Carnaby's Black Cockatoo (Cale 2003) list Salmon Gum and Wandoo as the primary breeding trees for the species and limited breeding in Red Morrell (*E. longicornis*), York Gum (*E. loxophleba*), Tuart (*E. gomphocephala*), Flooded Gum (*E. rudis*), Gimlet (*E. salubris*), Swamp Yate (*E. occidentalis*) and Marri (*Corymbia calophylla*). The Western Australian Museum has unpublished details of birds breeding in Karri at some sites in the south-west including Porongurup area, Denmark, Walpole, Frankland and Margaret River (Ron Johnstone pers. comm.), however Carnaby's Cockatoo generally occurs less frequently in Karri forests (Cale 2003).

The lack of breeding records in

Karri is likely to be due to the fact that the Carnaby's Cockatoo typically breeds in eucalypt woodland occurring in areas with 350–700 mm annual rainfall, and Karri forest generally occurs in areas of high rainfall exceeding 900 mm annually (Maher *et al.* 2010). The Porongurup Range is one of only a few areas of Karri to lie outside the 900 mm rainfall zone, the occurrence of Karri there is attributed to soil moisture storage being supplemented by run-off from adjacent granite outcrops (Maher *et al.* 2010).

Three species of black cockatoo occur in the Porongurup Range area. Carnaby's Cockatoo occurs in the area regularly, as does the similar Baudin's Cockatoo (*Calyptorhynchus baudinii*) and Forest Red-tailed Cockatoo (*C. banksii naso*). Baudin's Cockatoo typically occurs in the wet forests of the deep south-west and is known to breed in Karri (Johnstone and Kirkby 2008). Baudin's Cockatoo may breed in the Porongurup area, however the Porongurup Range is an island outlier of Karri occurring on the edge of its distribution. As a result, the Porongurup area may be more suitable for Carnaby's Cockatoo, which is more widespread throughout the region.

The lack of breeding records for the Porongurup area may indicate that Carnaby's Cockatoo is a relatively recent breeding visitor to the Porongurup Range, perhaps as a result of loss of

breeding habitat further inland. This species is increasingly looking further afield for nesting trees and may now be using Karri (Ron Johnstone pers. comm.).

Carnaby's Cockatoo show no preference for the aspect of natural hollows (Saunders 1979). It appears that the aspect of nesting sites is not important, at least in our survey area. The tree hollow faces south, while the nest box faces north and they are situated only 40 m apart.

The length of time taken to recruit replacement tree hollows, coupled with ongoing clearing and the species dependence on large areas of suitable feeding habitat near nesting sites, has placed a greater emphasis on nest boxes in the recovery of the species.

A wide variety of nest boxes designs have been erected for use by the Carnaby's Cockatoo. These include boxes made from tree hollows, black plastic pipe ('Cockatube') and wooden boards. The breeding success of our nest box highlights the success of wooden nest boxes made from plywood ('form ply'), however the longevity of such boxes is yet to be determined in high rainfall areas, such as in Karri Forest.

Carnaby's Cockatoo is known to return to its natal area to breed, and breeding can be clustered such that there are areas with a relatively high density of nests (Saunders 1986). This means there could be the potential for our site to become an important breeding area supporting several

pairs of the species. We will continue to regularly monitor the nesting sites and conduct further surveys in the Porongurup area to determine how widespread nesting is in the area.

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